#629 – December 2024

JUG

Publication of the Northern California Contest Club

NCCC

NCCC – 54 years of contesting excellence

President's Report

David West, KO6M

Inside This Issue

NCCC MEETING

https://nccc.cc/meetings.html

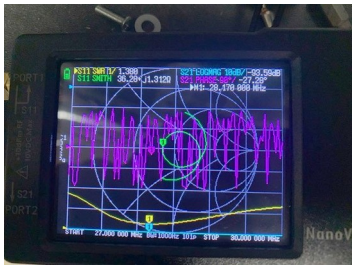
No Meeting in December

Happy Holidays!

Happy Holidays! I hope your Thanksgiving was filled with joy and that your Black Friday and Cyber Monday were filled with the deals you were looking for. Oddly, I had nothing on the list this year. I did however spend the time finishing up my 10m Moxon that I had started last year for the 10m contest. I'm happy to say that It's ready to go! The final 3d parts were printed and while one of them broke, I was able to improvise with a piece of wood. There are a few things I want to work out, but the SWR was spot on and the results when I tested it about 20' up on a painter's pole were fantastic! I had increased signal reports all over the place in FT8.

Here's the refresher for those wondering what I'm talking about: last year when we decided to go with the 10m Contest as a focus contest I wanted to make the 10m Moxon that the ARRL talks about in the ARRL Antenna

Book. The actual antenna is from the "A 10-Meter Moxon Beam," as found in the August 2009 QST. Let me know if you have a desire to make it and I can help you locate the article. However, last year time and creativity got in my way. This year I prevailed! (I also made the loaded 10m Dipole from this month's On the Air as well as a simple 10m/20m vertical but those aren't the star of the show.)



Based on my own advice from my November presentation I have been watching the MUF Map patterns via prop.kc2g.com and the real time contact patterns on 10m using DXMaps.com and I'm hoping things stay as active and promising for the next week or so.

I am ready for the 10m Contest, are you?

About NCCC

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QSL Mgr [K6CQP/N6CQP/W6CQP]: Dean Wood, N6DE
NAQP Teams: v**acant**
NA CW Sprint Teams: Bob Vallio, W6RGG
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Worked All CA Counties Award: Fred Jensen, K6DGW
Photographer: Bob Wilson, N6TV

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NS RTTY Sprint/Ladder: Ed Radlo, AJ6V

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Membership: Gary Johnson, NA6O/Ian Parker, W6TCP

JUG Editor

Fred Jensen, K6DGW: *k6dgwnv@gmail.com*

VP/CC

Chris, N6WM

Greetings KBers.

As I write this we are deep into taking sign-ups for our major club competition push, the ARRL 10 meter contest gavel competition. I am encouraged by the early sign-ups, and look forward to our upcoming team effort. It should be a fun time! Since I am spearheading this I'll keep it short and sweet this month … here goes:

I wanted to follow up on some of my previous articles to address the "rest of us". There are lots of folks that find it difficult, for whatever reason, to do full effort contests. Now I can understand hardcore 48 hour contesting is not for all of us. Its physically and mentally draining and quite honestly some folks just can't do it. Some folks just get out there and spin the dial, have some fun, and make a few contacts. And that is great!

But in the end we need to remember that Radiosport is a competitive aspect of the hobby.

These are contests, and ultimately folks compete in these contests for various objectives that to them is a win, ranging from winning the contest overall their division or section all the way to beating their neighbor or beating their own prior years score.

I wanted to remind you of some ways you can compete effectively in Radiosport, and still have extra time and not have to make that full 48 hour commitment, or have a big superstation.

Single op/Single band competitions: Many of the largest contests and some smaller offer these categories in all power levels, assisted and unassisted. These include:

ARRL DX contest SSB
ARRL DX contest CW
CQWW SSB/CW
CQWPX SSB/ CW
JIDX SSB/CW
All Asia SSB/CW

Picking Your Band: Doing an effort on an upper band could have you on the air during daylight hours and at the dinner table in the evening! In any case working a single band can be a way to stay competitive and not be bound by such a large time commitment.

Overlay categories: The CQ WW contests, include overlay categories that are designed for various operating situations.

Classic operator:

An operator can use 1 radio, and operate 24 of the 48 contest hours.

The CQ WPX contests in addition to classic, also include Tribander single element categories, allowing more typical stations to compete with their peers. If you have a tribander and single element wires for your low band antennas, this one is for you!

Also don't forget about the NCJ NAQP contests. Lasting only 12 hours of which a single operator can work 10, these are also great competitive events for folks who cannot make 48-hour contest commitments. They are fun, fast paced, are 100 W or less and don't take all weekend!

And of course, multi-op contesting allows you to compete with a team of operators, allowing the work load of the competition to be divided among the team.

So there are lots of options out there above and beyond spinning the dial. I think we can all agree, as NCCC members that we enjoy contests and competing. We can compete individually, as part of a multi-op team, and also as a contest club, as well as a combination of all! In any case its my honor to serve as your VP/CC and am working hard to do my part to help all of you get the most out of being part of our great Radiosport club. I wish you all the happiest of holidays, and victory for your.. and our collective

contesting efforts.

73 es KB

Chris, N6WM

Upcoming Contests

ARRL 10	**14 Dec 0000Z to 15 Dec 2359Z**
RAC Winter	29 Dec 0000Z to 2359Z
RTTY Round-up	4 Jan 1800Z to 5 Jan 2359Z
NAQP CW	11 Jan 1800Z to 12 Jan 0559Z
NAQP SSB	18 Jan 1800Z to 19 Jan 0559Z
CQ WW RTTY WPX	8 Feb 000Z to 9 Feb 2359Z
NAQP RTTY	22 Feb 1800z to 23 Feb 0600Z

Red entries denote NCCC Focus contest

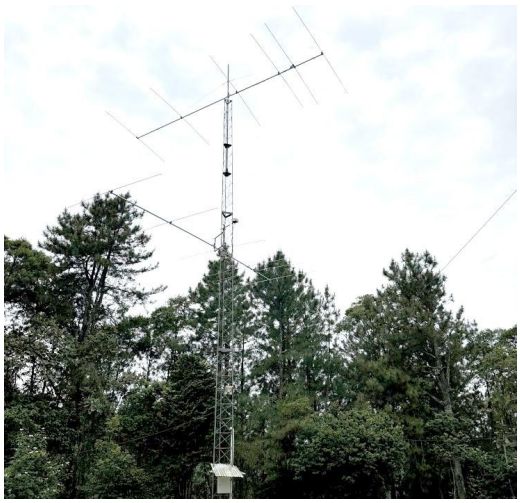
PEED	XXT	DAY	TIME (UTC)	EXCHANGE	SPONSOR LINK
25 wpm	MST	Monday	1300 - 1400z	Name and QSO serial number	International CW Council
25 wpm	MST	Monday	1900 - 2000z	Name and QSO serial number	International CW Council
25 wpm	MST	Tuesday	0300 - 0400z	Name and QSO serial number	International CW Council
+ wpm	CWT	Wednesday	1300 - 1400z	Name and CWops # (or S/P/C)	CWops
+ wpm	CWT	Wednesday	1900 - 2000z	Name and CWops # (or S/P/C)	CWops
+ wpm	CWT	Thursday	0300 - 0400z	Name and CWops # (or S/P/C)	CWops
+ wpm	CWT	Thursday	0700 - 0800z	Name and CWops # (or S/P/C)	CWops
0 wpm	SST	Friday	2000 - 2100z	Name and S/P/C	K1USN
0 wpm	SST	Monday	0000 - 0100z	Name and S/P/C	K1USN

PX2A

Roberto Sadkowski K6KM

During my 3 week visit to Brazil I had the privilege of visiting the contesting station PX2A. Carlos PY2VM, generously took time from his busy schedule to arrange a visit. It was a Friday so from all the invitees only Carlos PY2VM and Marcio PY2TTN could make it.

The station is strategically located in a State Park that happens to be a POTA (parks on the air) BR-0276 Serra do Mar State Park. The station location was found by accident while looking for a hilltop nearby. It was vacant and after negotiations with the owner, the PX2A group came to a deal.



It's a small flat-top at some 2500ft elevation and with clear views 360 degrees, particularly down to the Atlantic Ocean. The drawback is that the site is not big enough to spread the towers around much and it's already pretty much all used up.

There is a small house that hosts the operating positions plus a kitchen, bath and room with bunk beds for operators to rest between shifts. Members of the PX2A Group bring their own equipment to fill the operating positions. Manual antenna switches determine what band each position is pointing to. There is some remote capability available.

As with most club stations, the installation and effectiveness depends on volunteer work and resources are usually limited but collaboration and Team effort makes up for it. There are stacked monoband towers, the norm at competitive contesting stations and this is no exception. 10m/15m/20m. There is a two element 40m yagi up high also.

I failed to record the 80m tower which was down by

the entrance. There was much more but we were eager to get on the air. 38 QSOs in a few hours of operation under very rough conditions. Mostly CW 1.5kW. A couple of SOTA chases in US plus working Fernando de Noronha on SSB. My big “Thank You” to Carlos PY2VM for facilitating the visit and giving the tour of the station.

The Lumber Yard

Awards and Kudos for NCCC Members

Ian, W6TCP, Makes History!

lan Parker, W6TCP, a former editor of this newsletter, has made ham radio history. In his words: "***Ok 16:10 today I got #50 on 902 MHz to wrap up WAS on 50, 144, 222, 432, 902 and 1296 Mhz***" Gary, NA6O, commented:

"That makes W6TCP only the second ham to ever accomplish this feat. It took him 4 years with head-down, BIC, too much money, and a very focused effort. Nearly all the VHF/UHF was via EME and digital modes. And yes there was contesting involved, particularly the ARRL EME contests but also ARRL VHF to fill out 6m. A big KB to Ian. If anyone has questions about VHF/UHF, he's The Man to talk to."

Antenna of the Month

Off-Center Fed Dipole (OCF)

Gary, NA6O

Your Mileage May Vary, they say, and that certainly applies to this type of antenna. One way to access many HF bands on a single wire antenna is to feed a dipole off-center. Depending upon how much space you have, it may be designed to cover most of the bands 80 through 10 or 40 through 10 m with a usable match. You might also get it to work on 6 m. An antenna tuner is almost always a requirement since it will only rarely exhibit a low SWR. Like any horizontally-polarized antenna, it helps to mount it as high as possible and height will also change the impedance, sometimes drastically. There are countless designs on the web as well a commercial ones. In this article, we'll look at a typical design (Fig. 1) and consider some of the challenges associated with this popular antenna.

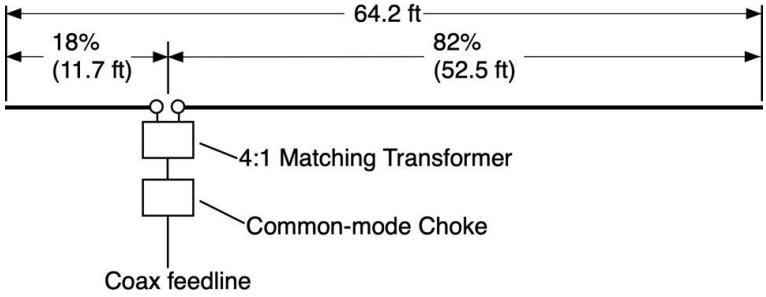


Fig 1. Components of a typical 40 through 10 m OCF dipole

Recall that any conductor will radiate as long as you can get RF current to flow in it, and where you connect the feedline along a dipole doesn't change the radiation pattern or the gain; it only changes the feedpoint impedance. The only other requirement is that you achieve a decent impedance match at your transmitter in order to transfer maximum power. With the OCF, we adjust both the length and the feed point location until the feed point impedance is **roughly the same** on most of the bands, starting with the one where the antenna is 1/2 wavelength long.

By "roughly the same," I don't mean 50 ohms, and in fact it's generally around 200 ohms or perhaps higher, and it's not just a pure resistance. So the first thing we need is a wideband matching device at the feedpoint. A 4:1 impedance transformer is the standard choice.

The second thing we need is a robust common-mode choke on the coax. Because the antenna is highly asymmetrical, substantial common-mode current is guaranteed to flow on the outside of the coax. In other words, the coax becomes an additional element of the

antenna. This will cause several problems: Antenna tuning becomes less predictable. High RF voltage may appear in your shack, raising all kinds of havoc. And local noise (RFI) riding on the outside of the coax will be conducted to the antenna, increasing your noise floor. All of these problems are mitigated by a common-mode choke (which should be a component of nearly every antenna installation).

What kind of SWR might you see? Figure 2 shows data provided by Palomar Engineers [Ref 1] for a 40-10m OCF installed at 30 feet. Assuming you actually get this result, any transceiver with a built-in antenna tuner is likely to match this on all the specified bands. If you're really lucky, it might also match on 80 m, though you may damage the balun/choke if you try to run very high power there. The longer 80 m designs may sacrifice the match on one or more higher bands in exchange for better results on 80. Please note that installation details can affect SWR, sometimes drastically, especially if the wire is close to other objects, near the ground, or bent into arbitrary paths. Adjusting the lengths may improve results. Plan on spending a lot of time with your antenna analyzer.

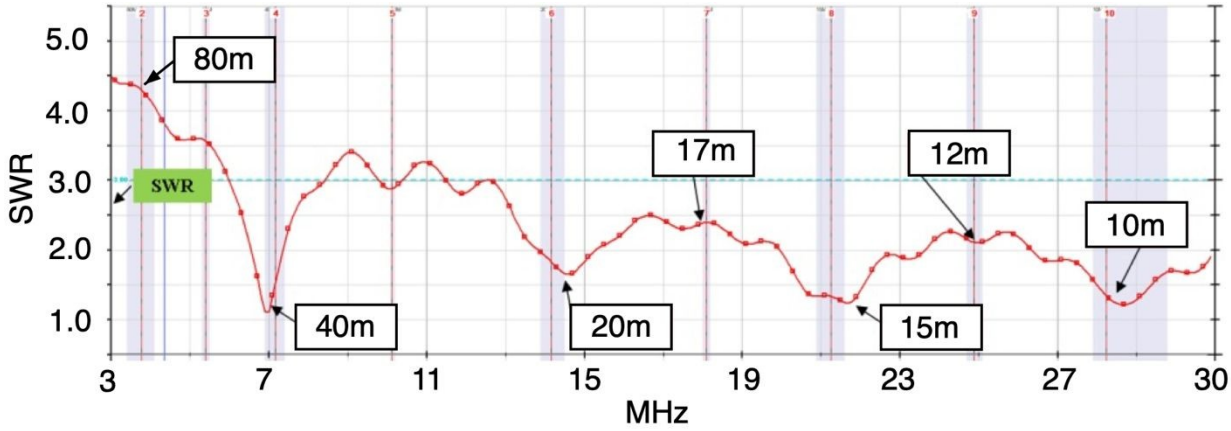
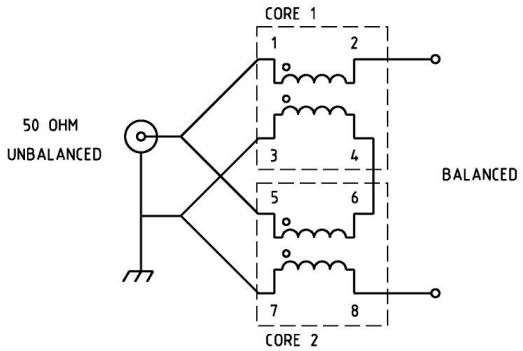


Fig. 2. SWR for a 40-10m OCF. Copied from the Palomar Engineers website and edited for readability. It should also work on 6 m. If you're really lucky, you might be able to use this on 80

Radiation patterns from these all-band antennas can only be described as chaotic. Every band will have a different pattern with higher frequencies consisting of a great many lobes in various directions. Height will of course change everything and as always, higher is generally better. It's fairly pointless to do a lot of simulations since the results are so dependent upon installation details. This is after all a compromise antenna, not a high-gain death-ray.

Finally there is the choke/balun, a very important component. It needs a 4:1 impedance ratio, which implies a 2:1 turns ratio. It also requires a very high



common-mode impedance. This can be achieved with two components, a transformer plus a choke, or with a single component commonly known as a Guanella current balun (*See Ref 2*). When properly designed, a Guanella can handle high power and meets all requirements. Figure 3 shows the schematic for this device. It consists of two common-mode chokes that are driven in parallel and then connected in series at the output.

Ferrite core material choice is important. I tested three types (Fair-Rite mixes 52, 43, and 31) and found that the lowest loss (0.20 dB at 30 MHz) was achieved with mix 52. Mix 43 was almost as good and may also be used. All cores are 2.4 inch OD. They may be wound with bifilar magnet wire or PTFE insulated wire, preferably 14 AWG. About 9-11 turns is optimal. The VK6YSF website has some clear fabrication instructions. It should be housed in a weatherproof nonmetallic enclosure, such as a 4x4x4 PVC Cantex box, available at Home Depot.

Fig 3. 4:1 impedance Guanella current balun using two ferrite cores

Fig 4 One of my test baluns

Some OCF users report problems with RF in the shack on certain bands. This is often because of insufficient choking impedance in the balun. An additional common-mode choke can be added, preferably at the antenna feedpoint but further along the feedline may also be helpful. That may also help avoid the ***flaming balun*** problem if you attempt to run high power.

To summarize, the OCF is likely to give you access to most of the HF bands with just a single wire. Radiation pattern will be random but certainly adequate for ordinary hamming. SWR may or may not be optimal on all desired bands in your particular installation but with some trimming it probably will be satisfactory and compatible with your antenna tuner. Hang it as high as you can and don't be afraid to bend it here and there to fit your yard. And always be sure to use a well-designed balun/choke.

References

1. *https://palomar-engineers.com/tech-support/tech-topics/antenna-notes/off-center-fed-dipole-notes*

2. https://vk6ysf.com/balun_guanella_current_1-4.htm.

2024 CQP Results Are Now Available

Dean, N6DE

Dean reports release of the CQP 2024 Individual results. This is the fastest the

individual results have been released in the fifty nine year history of the CQP. Club and specialty groups yet to come.

https://cqp.org/Results.html

Line Scores
Award Winners
50 Top 10 boxes in total
Time Challenge Results
POTA Challenge Results
Multiplier sweep list and fastest to 58 mults list
Soapbox comments

https://cqp.org/graphs.html

QSO graphs by hour, mode and band
Total logs, total QSOs, incoming log rates

OSCAR-7 Turns 50!

Launched in 1974, AMSAT OSCAR-7 has had a storied career in orbit not experienced by many LEO satellites, regardless of who built them. The first amateur satellite, OSCAR-1 was pretty simple … it sent "HI" in Morse code, and the code speed was proportional to the satellite temperature. By the 7th OSCAR, we had progressed to three beacons [29.502, 145.070, and 435.095 MHz] and a linear transponder [70 cm/2 m]. Unlike previous amateur satellites, it was placed in a near-circular polar orbit [90º inclination] at about 1,770 km [1,100 mi] altitude. This caused it to have visible passes over the entire planet, all you ~~had~~ have to do was wait until the right time, no matter where you are. Sometimes two consecutive usable passes would occur.

AO-7, as it came to be known, was powered by solar cells over it's entire external surface that charged a set of batteries. It was designed and constructed in the late 60's/early 70's, before microprocessors and it worked flawlessly. The beacons transmitted telemetry with several channels and the linear transponder allowed the use of CW and SSB. It exceeded it's planned operational lifetime by several times but alas, the charge/discharge cycles on the parallel-connected batteries eventually did them in and at least one of them shorted, the normal failure mode. This of course shorted the

solar cells and AO-7 went silent.

AMSAT and a number of other international amateur and university groups continued to build “homemade” satellites, some with transponders, some with FM repeaters, some for scientific exploration. AO-7 continued to circle the Earth silently until a couple of years ago when a ham in EU, sort of “just checking,” heard one of its beacons. The shorted battery had probably unshorted and become an open circuit. While it is definitely not a battery anymore, the open circuit allowed the solar cells to power the electronics again while AO-7 is in sunlight and OSCAR-7 resurrected itself! These batteries normally fail to a hard short and it is still unclear what caused AO-7's battery to open after so much time. But for whatever the reason, OSCAR-7, designed and built by amateurs, became the “Little Satellite That Could.”

How long will it go? 1,770 km is at the upper edge of the Low Earth Orbit range, atmospheric drag is very low, and AO-7, or at least its parts, will likely circle the Earth for many thousands or even tens of thousands of years or more. How long will it remain active on the air? Considerably less than it's orbital lifetime. The space environment slowly degrades the solar cells from radiation and micrometeor particles and eventually, radiation will finally cook one or more of it's components. It could be struck by space trash, although most of that is well below its altitude.

Happy Birthday Oscar!

Editor Notes

Seasons Greetings from the NCCC JUG and best wishes for the New Year. 2025 should continue with about the same solar condition, i.e. “Long periods of high SFI punctuated by episodes of ionospheric distress” ... pretty much what we've been experiencing in 2024.

A recent news blip reported that new research has identified “magnetic bands” on the sun that begin at the poles and slowly migrate to the equator where they disappear near the solar maximum only to reappear and then disappear at the solar minimum. A wrinkle is that one pair does this on the way up to the maximum but two successive ones do this on the way down to the minimum. There's now discussion that this phenomenon may be connected to the fact that the sun tends to be grumpier on the way to the minimum than on the way to the maximum. *Disclaimer: This news arrived unsolicited on my phone so we can all make of it what we each wish.*

Norm, N6JV, our Director of Thermionic Archaeology, broke his hip in a fall in his garage in November and was hospitalized to receive a new one. At JUG press time, Norm was reported doing well at a rehabilitation center in So. Sacramento. We look forward to his full recovery and return to the JUG pages.

NCCC Membership Information

If you wish to join NCCC, please fill out an application for membership, which will be read and voted upon at our monthly meeting. To join, you must reside within club territory which is defined as everything in California north of the Tehachapi's up to the Oregon state line, and part of northwestern Nevada (anything within our ARRL 175-mile radius circle centered at 10 miles north of Auburn on Highway 49).

Life Memberships

Life memberships are $250.00 Contact secretary.nccc@gmail.com. Members who have reached 80 years of age have and been an NCCC member for 20 or more years are eligible for Honorary Life Membership ("80/20 Rule"). Contact secretary.nccc@gmail.com

JUG Articles Wanted!

Your help allows us to produce a quality newsletter. Please consider submitting an article! The editor welcomes any and all relevant articles for inclusion in the JUG. The preferred format is plain, unformatted ASCII text, MS Word (.doc/.docx) are acceptable. Indicate the insertion point and title of diagrams and pictures in the text and attach photos/diagrams separately. Pictures should be as high a resolution as available. Please do not spend time formatting your submittal, the publication templates will re-format everything. Send your material to *k6dgwnv@gmail.com* indicating "JUG Submittal" in the subject.

Northern California Contest Club Reflector—Guidelines

The NCCC email reflector is devoted to the discussion of contesting. Topics include contests, station building, dxpeditions, technical questions, contesting questions, amateur radio equipment wants/sales, score posting, amateur radio meetings/ conventions, and membership achievements. Postings may not include personal attacks, politics, or off-subject posts. Such postings will be considered a violation of the Guidelines

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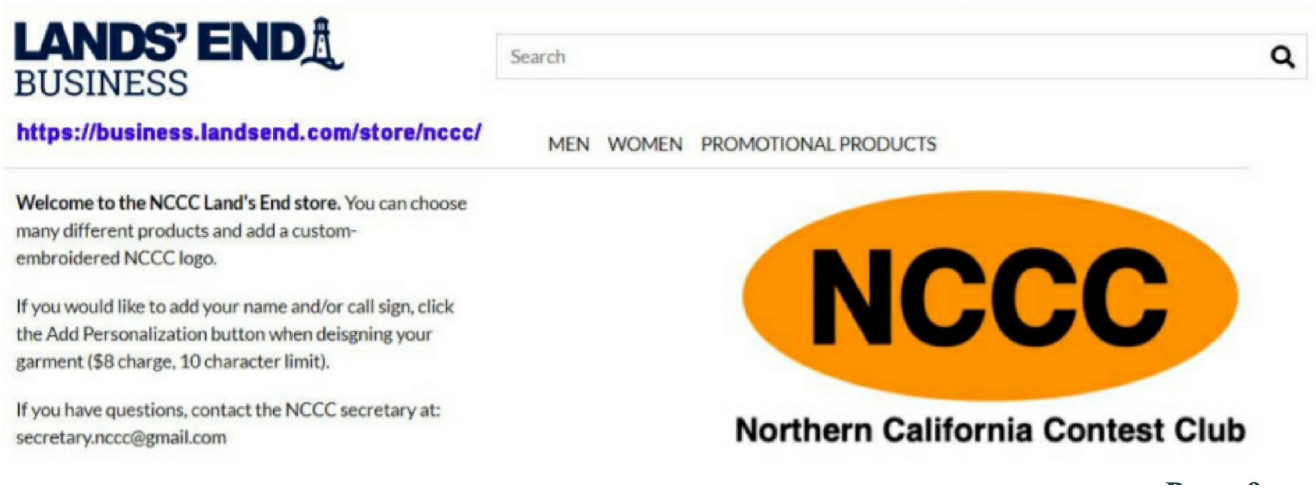
Twitter: “NCCCKB”



NCCC Lands' End Store

We are pleased to announce that the new NCCC Land's End store is online! You can choose from an array of shirts, jackets, and hats and apply your choice of custom-embroidered NCCC logos: A plain one, or one that also says Fifty Years. And, you can personalize your item by adding your name and/or call sign. The store is open 24/7 and items are shipped directly to you. No more waiting for everyone else to make up their minds on a group purchase.

https://business.landsend.com/store/nccc/ or from the NCCC website: http://nccc.ccc/members/lestore.html Thanks to W6TCP for helping to set this up. Instructions for purchases from Lands' End NCCC Store

1. Go to https://business.landsend.com/store/nccc/
2. Click on Men's or Women's link, then choose item(s)
3. Pick color, inter quantity of each size you want to order.
4. Click Apply Logos and Personalizations. This will display the logo choices. Try them out. It will show you what they look like on your chosen fabric color.
5. Select a location for logo (left side, ride side, back, etc)
6. Click Apply Logo.
7. Optionally, click Add Personalization to add your name or call sign ($8.00, 10 character limit)
8. Click Add to Bag and Continue Shopping or.

K4 HIGH-PERFORMANCE DIRECT SAMPLING SDR

A direct-sampling SDR you'll love to use

Our new K4 transceiver harnesses advanced signal processing while retaining the best aspects of the K3S and P3. It features a 7" touch display, plus a rich set of dedicated controls. Per-VFO transmit metering makes split mode foolproof. Band-stacking registers and per-receiver settings are versatile and intuitive. Control usage information is just one tap away thanks to a built-in help system.

Modular, hybrid architecture adapts to your needs

The basic K4 covers 160-6 m, with dual receive on the same or different bands. The K4D adds diversity receive, with a full set of band-pass filters for the second receiver. (Thanks to direct RF sampling, there's no need for crystal filters in either the K4 or K4D.) The K4HD adds a dual superhet module for extreme-signal environments. Any K4 model can be upgraded to the next level, and future enhancements--such as a planned internal VHF/UHF module--can be added as needed.

Single or dual panadapter, plus a high-resolution tuning aid

The main panadapter can be set up as single or dual. Separate from the main panadapter is our per-receiver *mini-pan* tuning aid, with a resampled bandwidth as narrow as +/- 1 kHz. You can turn it on by tapping either receiver's S-meter or by tapping on a signal of interest, then easily auto-spot or fine tune to the signal.

Comprehensive I/O, plus full remote control

The K4's rear panel includes all the analog and digital I/O you'll ever need. All K-line accessories are supported, including amps, ATUs, and our K-Pod controller. The Video output can mirror the K4 screen or display a high-res Panadapter only screen. Via Ethernet, the K4 can be 100% remote controlled from a PC, notebook, tablet, or even another K4, with panadapter data included in all remote displays. Work the world from anywhere--in style!

K4 KEY FEATURES

- Optimized for ease of use
- Modular, upgradeable design
- 7" color screen with touch and mouse control
- ATU with 10:1+ range, 3 antenna jacks
- Up to 5 receive antenna sources
- Full remote control via Ethernet

The K4 interfaces seamlessly with the KPA500 and KPA1500 amplifiers

'The performance of their products is only eclipsed by their service and support. Truly amazing!' **Joe - W1GO**

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• 1.2kHz "Optimum" roofing filter • New local oscillator design • Improved phase noise • Improved spectrum scope • Dual scope function • Enhanced mouse operation for spectrum scope

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IC-R8600 | *Wideband SDR Receiver*

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IC-718 | *HF Transceiver*

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IC-705 | *HF/50/144/430 MHz All Mode Transceiver*

• RF Direct Sampling • Real-Time Spectrum Scope and Waterfall Display • Large Color Touch Screen • Supports QRP/QRPp • Bluetooth® and Wireless LAN Built-in

IC-7100 | *All Mode Transceiver*

• HF/50/144/430/440 MHz Multi-band, Multi-mode, IF DSP • D-STAR DV Mode (Digital Voice + Data) • Intuitive Touch Screen Interface • Built-in RTTY Functions

IC-2730A | *VHF/UHF Dual Band Transceiver*

• VHF/VHF, UHF/UHF simultaneous receive • 50 watts of output on VHF and UHF • Optional VS-3 Bluetooth® headset • Easy-to-See large white backlight LCD • Controller attachment to the main Unit

ID-5100A Deluxe

VHF/UHF Dual Band Digital Transceiver

• Analog FM/D-Star DV Mode • SD Card Slot for Voice & Data Storage • 50W Output on VHF/UHF Bands • Integrated GPS Receiver • AM Airband Dualwatch

IC-V3500 | *144MHz FM Mobile*

• 65W of Power for Long Range Communications • 4.5 Watts Loud & Clear Audio • Modern White Display & Simple Operation • Weather Channel Receive & Alert Function

IC-2300H | *VHF FM Transceiver*

• 65W RF Output Power • 4.5W Audio Output • MIL-STD 810 G Specifications • 207 alphanumeric Memory Channels • Built-in CTCSS/DTCS Encode/Decode • DMS

IC-V86 | *VHF 7W HT*

• 7W OutputPower Plus New Antenna Provides 1.5 Times More Coverage • More Audio, 1500 mW Audio Output • IP54 & MIL-STD 810G–Rugged Design Against Dust & Water • 19 Hours of Long Lasting Battery Life • 200 Memory Channels, 1 Call Channel & 6 Scan Edges

IC-T10 | *Rugged 144/430 MHz Dual Band*

• Disaster Ready - Excellent Fit for Your Emergency Bag • Loud Audio - New Speaker Design • Long Bettery Life - Up to 11 Hours • FM Broadcast & Weather Channels

ID-52A | *VHF/UHF D-STAR Portable*

• Bluetooth® Communication • Simultaneous Reception in V/V, U/U, V/U and DV/DV • Enriched D-STAR® Features Including the Terminal Mode/Access Point Mode • UHF (225–374.995MHz) Air Band Reception

5 Ways to Shop!

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FTDX101MP | *200W HF/50MHz Transceiver*

• Hybrid SDR Configuration • Unparalleled 70 dB Max. Attenuation VC-Tune • New Generation Scope Display 3DSS • ABI (Active Band Indicator) & MPVD (Multi-Purpose VFO Outer Dial) • PC Remote Control Software to Expand the Operating Range • Includes External Power With Matching Front Speaker

FTDX10 | *HF/50MHz 100 W SDR Transceiver*

• Narrow Band and Direct Sampling SDR • Down Conversion, 9MHz IF Roofing Filters Produce Excellent Shape Factor • 5" Full-Color Touch Panel w/3D Spectrum Stream • High Speed Auto Antenna Tuner • Microphone Amplifier w/3-Stage Parametric Equalizer • Remote Operation w/optional LAN Unit (SCU-LAN10)

FT-991A | *HF/VHF/UHF All ModeTransceiver*

Real-time Spectrum Scope with Automatic Scope Control • Multi-color waterfall display • State of the art 32-bit Digital Signal Processing System • 3kHz Roofing Filter for enhanced performance • 3.5 Inch Full Color TFT USB Capable • Internal Automatic Antenna Tuner • High Accuracy TCXO

FTDX101D | *HF + 6M Transceiver*

• Narrow Band SDR & Direct Sampling SDR • Crystal Roofing Filters Phenomenal Multi-Signal Receiving Characteristics • Unparalleled - 70dB Maximum Attenuation VC-Tune • 15 Separate (HAM 10 + GEN 5) Powerful Band Pass Filters • New Generation Scope Displays 3-Dimensional Spectrum Stream

FT-710 Aess | *HF/50MHz 100W SDR Transceiver*

• Unmatched SDR Receiving Performance • Band Pass Filters Dedicated for the Amateur Bands • High Res 4.3-inch TFT Color Touch Display • AESS: Acoustic Enhanced Speaker System with SP-40 For High-Fidelity Audio • Built-in High Speed Auto Antenna Tuner

FT-891 | *HF+50 MHz All Mode Mobile Transceiver*

Stable 100 Watt Output • 32-Bit IF DSP • Large Dot Matrix LCD Display with Quick Spectrum Scope • USB Port Allows Connection to a PC with a Single Cable • CAT Control, PTT/RTTY Control

FTM-300DR | *C4FM/FM 144/430MHz Dual Band*

• 50W Output Power • Real Dual Band Operation • Full Color TFT Display • Band Scope • Built-in Bluetooth • WiRES-X Portable Digital Node/Fixed Node with HRI-200

FT-2980R | *Heavy-Duty 80W 2M FM Transceiver*

• 80 watts of RF power • Large 6 digit backlit LCD display for excellent visibility • 200 memory channels for serious users

FTM-200DR | *C4FM/FM 144/430MHz Dual Band*

• 1200/9600bps APRS® Data Communications • 2" High-Res Full-Color TFT Display • High-Speed Band Scope • Advanced C4FM Digital Mode • Voice Recording Function for TX/RX

FTM-400XD | *2M/440 Mobile*

• Color display-green, blue, orange, purple, gray • GPS/APRS • Packet 1200/9600 bd ready • Spectrum scope • Bluetooth • MicroSD slot • 500 memory per band

FT-70DR *C4FM/FM 144/430MHz Xcvr*

• System Fusion Compatible • Large Front Speaker delivers 700 mW of Loud Audio Output • Automatic Mode Select detects C4FM or Fm Analog and Switches Accordingly • Huge 1,105 Channel Memory Capacity • External DC Jack for DC Supply and Battery Charging

FT-5DR *C4FM/FM 144/430 MHz Dual Band*

• High-Res Full-Color Touch Screen TFT LCD Display • Easy Hands-Free Operation w/Built-In Bluetooth® Unit • Built-In High Precision GPS Antenna • 1200/9600bps APRS Data Communications • Supports Simultaneous C4FM Digital • Micro SD Card Slot

FT-65R | *144/430 MHz Transceiver*

Compact Commercial Grade Rugged Design • Large Front Speaker Delivers 1W of Powerful Clear Audio • 5 Watts of Reliable RF Power Within a compact Body • 3.5-Hour Rapid Charger Included • Large White LED Flashlight, Alarm and Quick Home Channel Access

FTM-6000R | *50W VHF/UHF Mobile Transceiver*

• All New User Operating Interface-E20-III (Easy to Operate-III) • Robust Speaker Delivers 3W of Clear, Crisp Receive Audio • Detachable Front Panel Can Be Mounted in Multiple Positions • Supports Optional Bluetooth® Wireless Operation Using the SSM-BT10 or a Commercially Available Bluetooth® Headset

5 Ways to Shop!

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